

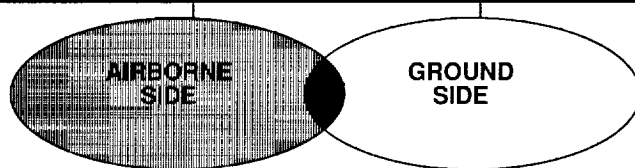
**A FLIGHT TEST FACILITY DESIGN FOR  
EXAMINING DIGITAL INFORMATION TRANSFER**

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# AIRCRAFT / GROUND INFORMATION EXCHANGE

**OBJECTIVE:** EXPLORE AND DEFINE INTERFACE / MESSAGE CONCEPTS FOR EFFECTIVE INFORMATION EXCHANGE THROUGH DATA LINK SYSTEMS



## SYSTEMS CHALLENGES:

- USER-CENTERED AUTOMATION
- DATA BASE COMPATIBILITY
- OPERATIONAL PROCEDURES

NASA LaRC

## DATA LINK RESEARCH ACTIVITIES

### PRIMARY DIRECTION: ATC/WEATHER COMMUNICATIONS

#### ■ SINGLE PILOT IFR PROGRAM

- FLIGHT EVALUATION -- CR-3461 / CR-3653
- SIMULATOR INVESTIGATION -- TP-2837

#### ■ DEVELOPMENT OF AN AIR GROUND DATA EXCHANGE CONCEPT:

- FLIGHT DECK PERSPECTIVE -- CR-4074
- ATC GROUND PERSPECTIVE -- BEING DRAFTED

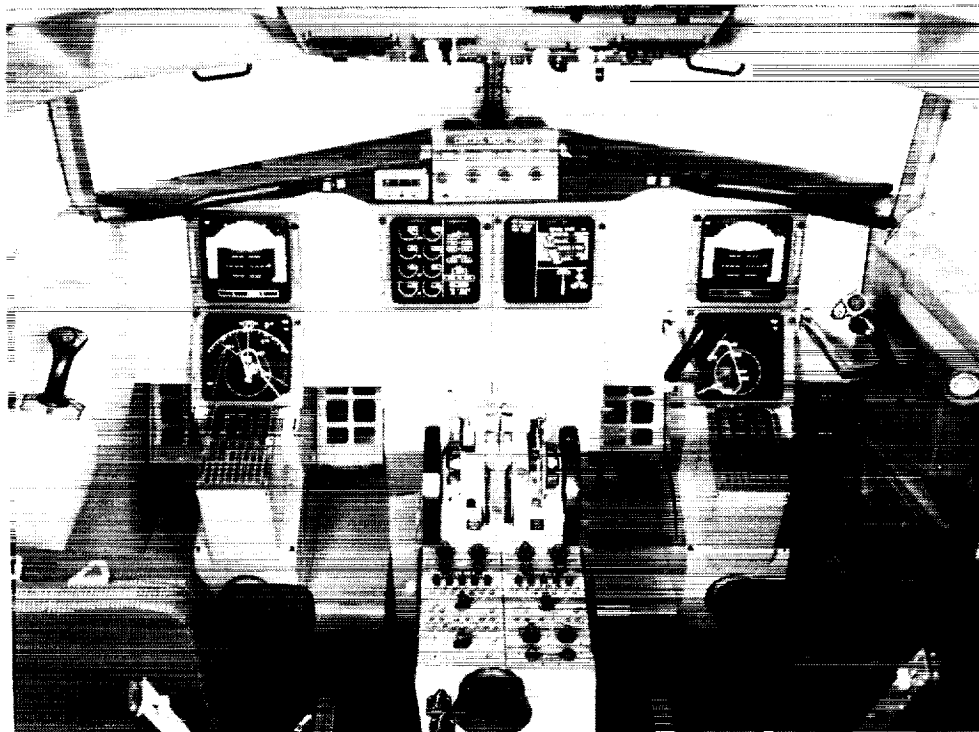
#### ■ NASA ATOPS COMMERCIAL JET TRANSPORT OPERATIONS

- INITIAL PILOTED SIMULATION -- TP-2859
- TOUCH PANEL/COMPUTERIZED VOICE INTERFACE -- PILOTED SIMULATION -- COMPLETED
- TYPICAL AIRLINE MISSION FLIGHT PROFILE -- FLIGHT TEST -- NOV '89

## NASA Transport System Research Vehicle (TSRV)

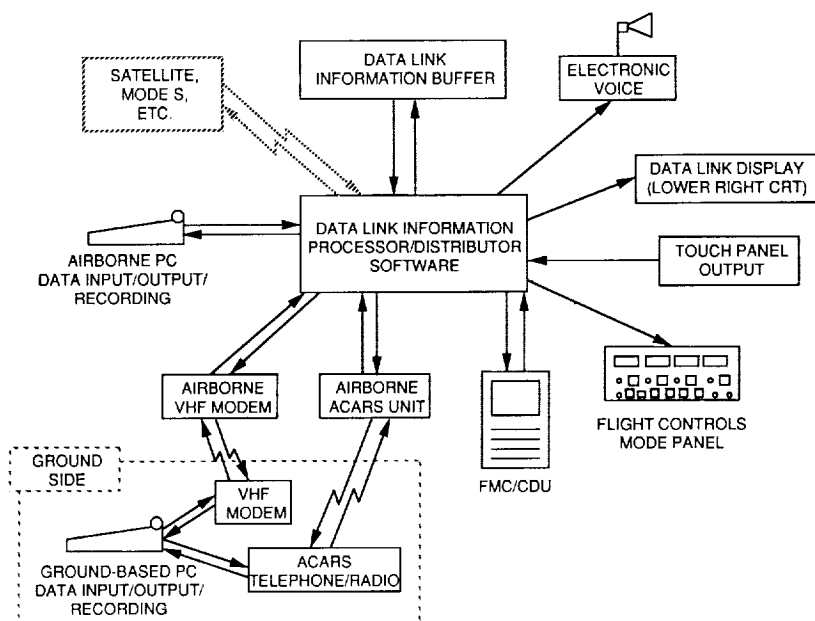


### TSRV Research Cockpit

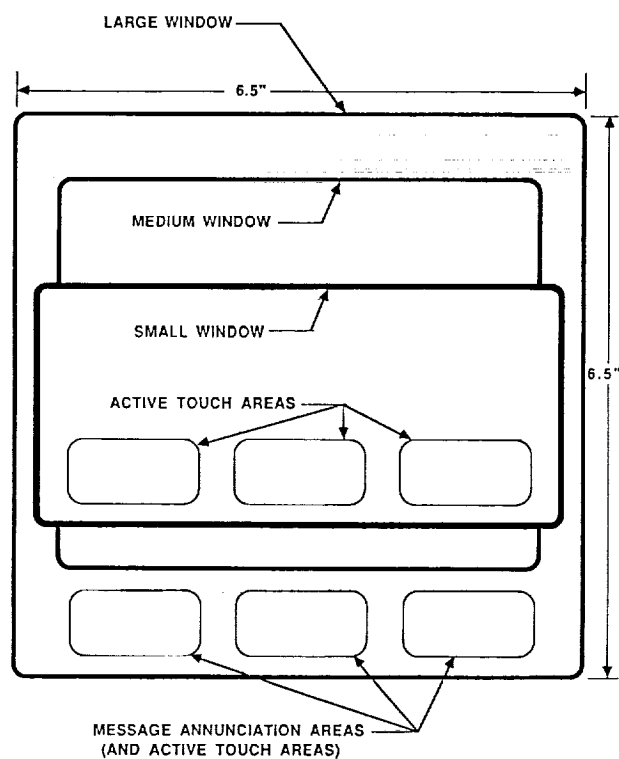


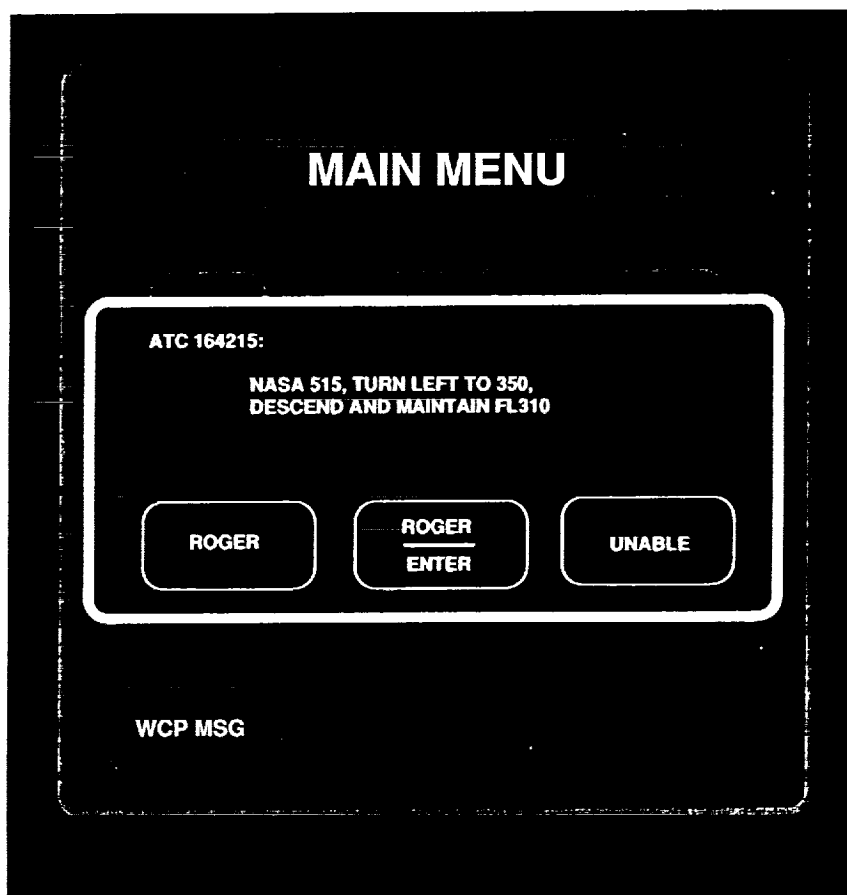
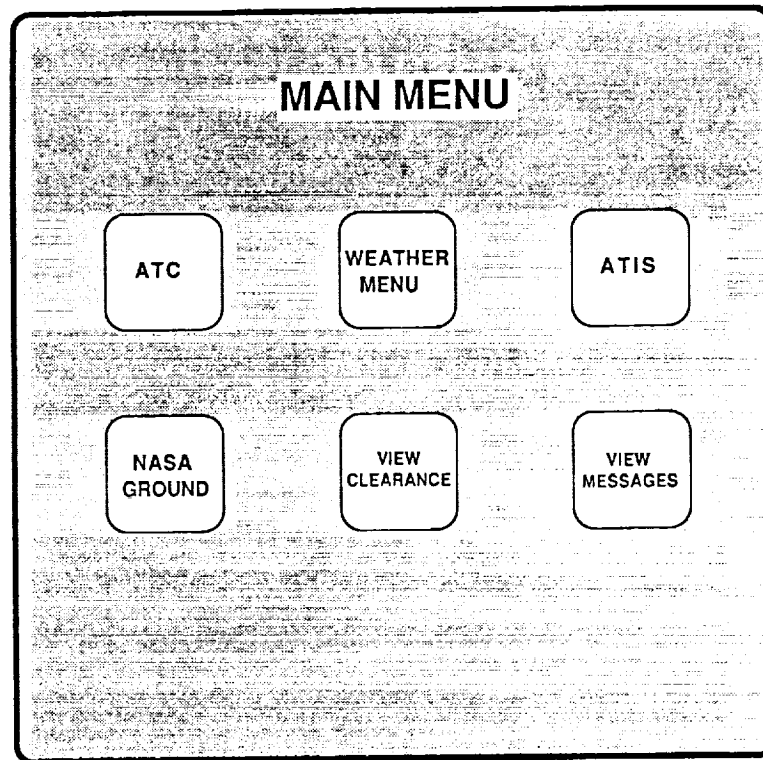
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## DATA LINK RESEARCH SETUP



## Data Link Display Format





# INITIAL TSRV DATA LINK FLIGHT TEST

**TEST OBJECTIVE:** COMPARISON OF CURRENT VOICE COMMUNICATIONS TO DIGITAL INFORMATION TRANSFER FOR AN EFIS-EQUIPPED TRANSPORT AIRPLANE DURING FULL MISSION SCENARIO TYPICAL OF COMMERCIAL AIRLINE FLIGHT OPERATIONS

## **SPECIFIC FOCUS:**

- ADVANCED DATA LINK/CREW INTERFACE DESIGN
- CREW ACCEPTANCE AND PERCEIVED WORKLOAD
- ROUND-TRIP COMMUNICATION RESPONSE TIME
- AUTO-ENTRY OF DATA (PILOT APPROVED) INTO AIRCRAFT SYSTEMS

## FLIGHT TEST SETUP

### **COMMUNICATIONS CAPABILITY COMPARISON:**

- o VOICE RADIO ONLY
- o DATA LINK WITH CRT DISPLAY  
+ VOICE RADIO BACKUP
- o DATA LINK WITH CRT DISPLAY  
+ COMPUTERIZED VOICE OF DATA LINK MESSAGE  
+ VOICE RADIO BACKUP

### **TYPE OF COMMUNICATIONS MESSAGES:**

#### VOICE TRANSMISSIONS

- |               |                 |
|---------------|-----------------|
| - ATC SIGN-ON | - TRAFFIC CALLS |
| - URGENT      | - NEGOTIATIONS  |

#### DIGITAL COMMUNICATIONS

- |   |                 |
|---|-----------------|
| - ATC TACTICAL                                  | - ATC STRATEGIC |
| - INFORMATION (ATC, WEATHER, ATIS, NASA GROUND) |                 |

# **FLIGHT TEST SETUP - (CONC)**

## **FLIGHT PROFILE:**

- o TAKEOFF AND LANDING AT NASA WALLOPS FLIGHT FACILITY
- o THREE PHASE FLIGHT PATH (~250 NM)
  - TAKEOFF AND CLIMB
  - ABBREVIATED CRUISE
  - DESCENT AND LANDING

## **TEST SUBJECTS:**

- o COMMERCIAL LINE PILOTS

## **DATA COLLECTION:**

- o PILOT COMMENTS, QUESTIONNAIRE, DEBRIEFING
- o SWAT
- o MESSAGE AND TRANSMISSION/RESPONSE TIMES
- o AIRPLANE STATE AND FMS AND FLIGHT CONTROL SYSTEM CONFIGURATION